

**STATEMENT OF WORK
REMEDIAL DESIGN
GOWANUS CANAL SUPERFUND SITE
BROOKLYN, KINGS COUNTY, NEW YORK**

I. INTRODUCTION AND ROD REQUIREMENTS

The purpose of this Statement of Work (SOW) is to specify the tasks Respondents shall undertake to design the remedy selected in the Record of Decision (ROD) issued by the U.S. Environmental Protection Agency (EPA) on September 27, 2013, for the Gowanus Canal Superfund Site (Site). This SOW is an attachment to the Settlement Agreement and Order on Consent, CERCLA Docket No. 02-2014-2001 (Settlement Agreement).

The ROD includes, but is not limited to, the following components:

- Dredging of the entire column of hazardous substance-contaminated sediments which have accumulated above the native sediments in the upper and mid-reaches of the canal (referred to as “soft sediments”).
- In-situ stabilization (ISS)¹ of those native sediments in select areas in the upper and mid-reaches of the canal contaminated with high levels of nonaqueous phase liquid (NAPL).²
- Construction of a multilayered cap in the upper and mid-reaches of the canal to isolate and prevent the migration of polycyclic aromatic hydrocarbons (PAHs) and residual NAPL from native sediments.
- Dredging of the entire soft sediment column in the lower reach of the canal.
- Construction of a multilayer cap to isolate and prevent the migration of PAHs from native sediments in the lower reach of the canal.
- Off-Site treatment of the NAPL-impacted sediments dredged from the upper and mid-reaches of the canal with thermal desorption,³ followed by beneficial reuse off-Site (e.g., landfill daily cover) if possible.
- Off-Site stabilization of the less contaminated sediments dredged from the lower reach of the canal and the sediments in the other reaches not

¹ ISS involves mixing of materials, such as Portland cement, into sediments to bind the contaminants physically/chemically.

² NAPL is concentrated liquid contamination, typically oil-like, that forms a separate phase and is not miscible with water.

³ Desorption utilizes heat to increase the volatility of organic contaminants so that they can be removed and destroyed.

impacted by NAPL, followed by beneficial reuse off-Site.

- Excavation and restoration of approximately 475 feet of the filled-in former 1st Street turning basin.
- Excavation and restoration of the portion of the 5th Street turning basin beginning underneath the 3rd Avenue bridge and extending approximately 25 feet to the east and the installation of a barrier or interception system at the eastern boundary of the excavation.
- Implementation of institutional controls incorporating the existing fish consumption advisories (modified, as needed), as well as other controls to protect the integrity of the cap.
- Periodic maintenance of the cap and long-term monitoring to insure that the remedy continues to function effectively.
- Combined sewer overflow (CSO) control measures for the upper reach of the canal to significantly reduce overall contaminated solid discharges to the canal as follows:
 - Construction of in-line sewage/stormwater retention tanks to retain stormwater which currently discharges through outfalls RH-034 and OH-007. It is estimated that an 8-million gallon tank and a 4-million gallon tank shall be required to address CSOs from outfalls RH-034 and OH-007, respectively. In addition, outfalls located in the vicinity of outfalls RH-034 and OH-007 that contribute smaller CSOs shall be connected to the retention tanks. The location of the retention tanks shall be determined during the remedial design. While the sizes of the tanks shall be determined during the remedial design, they are expected to conform with the requirements of the Clean Water Act and to accommodate projected additional loads to the combined sewer system that result from current and future residential development, as well as periods of high rainfall, including future rainfall increases that may result from climate change.
 - In the event that the permanent measures described above are not implemented in a timely manner, interim controls, such as temporary solids capture and removal, shall be implemented to mitigate sediment from the CSO discharges until the permanent measures have been implemented.⁴

⁴ It is unlikely that permanent measures to control the CSO discharges will be in place before the commencement of the remediation of the canal sediments.

- Implementation of appropriate engineering controls to ensure that hazardous substances and solids from separated stormwater, including from future upland development projects, are not discharged to the canal.
- To prevent recontamination of the canal following the implementation of the above-described remedial actions, the upland sources of hazardous substances, including discharges from three former manufactured gas plants (MGPs), CSOs, other contaminated upland areas and unpermitted pipes along the canal, must be addressed prior to the commencement of, or in phased coordination with, the implementation of the selected remedy.
- The former MGP facilities are being addressed by National Grid, a potentially responsible party (PRP) for these facilities and the Site, under NYSDEC oversight. Based upon the first NYSDEC-selected remedy at one of these former MGP facilities and NYSDEC guidance for presumptive remedies at former MGP facilities, it is assumed that a range of actions shall be implemented at the facilities (that may include removal of mobile sources, construction of cut-off walls along the canal, and active recovery of NAPL near the cut-off walls for each of the former MGP facilities) which shall prevent the migration of contamination from the former MGP facilities into the canal. The cleanup of the former MGP facilities shall be completed in accordance with schedules agreed upon between the EPA and NYSDEC.
- In the unlikely event that timely and effective state-selected remedial actions are not implemented at a given former MGP facility, the EPA may implement actions pursuant to CERCLA to ensure the protectiveness of the selected remedy.
- Current and future high density residential redevelopment along the banks of the canal and within the sewershed shall adhere to NYC rules for sewer connections (Chapter 31 of Title 15 of the Rules of the City of New York) and shall be consistent with current NYC Department of Environmental Protection (NYCDEP) criteria (NYCDEP, 2012) and guidelines to ensure that hazardous substances and solids from additional sewage loads do not compromise the effectiveness of the permanent CSO control measures by exceeding their design capacity.
- The remedy also includes the control or elimination of unpermitted pipe outfalls.

II. PERFORMANCE STANDARDS

Performance standards are the cleanup standards, Remedial Action Objectives, and other measures of achievement of the goals of the remedy selected in the ROD. The RD performed pursuant to this SOW shall be developed to achieve compliance with the Performance Standards. See ROD, "Remedial Action Objectives" and "Compliance with ARARs" sections and Settlement Agreement, Paragraph 10.k.

The following RAOs were established for the Site:

- Reduce the cancer risk to human health from the incidental ingestion of and dermal contact with PAHs in sediment during recreational use of the canal or from exposure to canal overflow to levels that are within or below the EPA's excess lifetime cancer risk range of 10^{-6} to 10^{-4} .
- Reduce the contribution of PCBs from the Gowanus Canal to fish and shellfish by reducing the concentrations of PCBs in Gowanus Canal sediment to levels that are within the range of Gowanus Bay and Upper New York Bay reference concentrations.
- Reduce the risks to benthic organisms in the canal from direct contact with PAHs. PCBs and metals in the sediments by reducing sediment toxicity to levels that are comparable to reference conditions in Gowanus Bay and Upper New York Bay.
- Reduce the risk to herbivorous birds from dietary exposure to PAHs.
- Eliminate the migration of NAPL into the canal so as to minimize NAPL serving as a source of contaminants, primarily PAHs, to the canal.

III. COMMUNITY RELATIONS

To the extent requested by EPA, Respondents shall provide information relating to the Work required hereunder for EPA's use in developing and implementing a Community Relations Plan. As requested by EPA, Respondents shall participate in the preparation of appropriate information disseminated to the public and participate in public meetings, which may be held or sponsored by EPA, to explain activities at or concerning the Site.

IV. PRE-REMEDIAL DESIGN ACTIVITIES

- A. Pre-RD activities shall be conducted by Respondents to gather sufficient information necessary to fully develop the RD. Respondents shall perform pre-RD activities and investigations including, but not limited to, the following:
1. A detailed survey of the canal bottom for performing pre-construction large debris removal;
 2. A plan for debris removal, decontamination and disposal;
 3. A survey and assessment, as it relates to the implementation of the remedy, of the integrity of existing bulkhead along the canal and a determination of the extent of temporary bulkhead installation required for remedy implementation;
 4. A plan for staging site selection and implementation of staging operations;
 5. Data collection for the evaluation of groundwater upwelling at the canal bottom for identification of groundwater discharge areas and measurements of discharge rate;
 6. Evaluation of upland locations requiring cut-off walls or other remedial measures as a result of NAPL that has migrated to upland locations and determination of the extent (depth, length) of cut-off walls at each location;
 7. Evaluation of canal native sediment to identify areas of potentially mobile NAPL for the ISS treatment boundaries;
 8. A site selection plan for the location of the two retention tanks cited in the remedy;
 9. A plan for temporary measures for capture/control CSO solids discharges at RH-034 and OH-007 until implementation of the permanent measures (retention tanks); and
 10. A plan for compliance with Federal and State archeological requirements.
- B. All work required under Section IV.A., above, shall be completed and submitted to EPA for approval no later than October 1, 2014, with the exception of the plan cited in Section IV.A.9., above, which shall be submitted to EPA for approval no later than July 1, 2014.

- C. Within thirty (30) days of the Effective Date of the Settlement Agreement, Respondents shall submit a Pre-Design Work Plan that addresses all of the elements of Section IV.A., above. EPA will either approve the Pre-Design Work Plan or otherwise respond pursuant to Section IX (EPA Approval of Plans and Other Submissions) of the Settlement Agreement.
- D. The Pre-Design Work Plan shall also include, but need not be limited to, the following:
1. A Quality Assurance Project Plan (QAPP), which shall be prepared consistent with the *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP), Parts 1, 2 and 3, EPA-505-B-04-900A, B and C, March 2005 or newer, and other guidance documents referenced in the aforementioned guidance documents and in accordance with the Settlement Agreement and this RD SOW. The UFP documents may be found at: www.epa.gov/fedfac/documents/qualityassurance.htm. In addition, the guidance and procedures located in the EPA Region 2 DESA/HWSB web site: www.epa.gov/region02/ga/documents.htm, as well as other OSWER directives and EPA Region 2 policies should be followed, as appropriate.
 - a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to EPA policy and guidance regarding sampling, quality assurance, quality control, data validation, and chain of custody procedures. Respondents shall incorporate these procedures into the QAPP in accordance with the *Uniform Federal Policy for Implementing Quality Systems* (UFP-QS), EPA-505-F-03-001, March 2005; *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP), Parts 1, 2, and 3, EPA-505-B-04-900A, B, and C, March 2005 or newer; and other guidance documents referenced in the aforementioned guidance documents. Subsequent amendments to the above, upon notification by EPA to Respondents of such amendments, shall apply only to procedures conducted after such notification.
 - b. The QAPP shall provide for collection of data sufficient to support the RD activities in Remedial Target Area 1 and Area 2, as defined in the ROD, including pre-design studies, pilot testing, and periodic groundwater monitoring to assess MNA.
 - c. The QAPP shall specifically include the following items:
 - i. An explanation of the way(s) the sampling, analysis, testing, and monitoring will produce data for the RD;

- ii. A detailed description of the sampling, analysis, and testing to be performed, including sampling methods, analytical and testing methods, sampling locations and frequency of sampling to be implemented to sample and analyze the contaminants found in groundwater, except that a description of sampling locations and frequency need not be included in the QAPP if those items are specified in any work plan(s) approved pursuant to the Settlement Agreement;
 - iii. A description of how sampling data and a site base map will be submitted in a manner that is consistent with the Region 2 Electronic Data Deliverable (EDD) format (information available at www.epa.gov/region02/superfund/medd.htm);
 - iv. A map depicting sampling locations (to the extent that these can be defined when the QAPP is prepared); and
 - v. A schedule for performance of the specific tasks in subparagraphs (c)(i)-(iii) of this Section unless specified in any work plan(s) approved pursuant to the Settlement Agreement.
- d. In the event that additional sampling locations, testing, or other alterations of the QAPP are requested by Respondent, Respondents shall submit to EPA a memorandum documenting the need for additional data to the EPA Project Coordinator within thirty (30) days of identification. EPA in its discretion will determine whether the additional data will be collected by Respondents and whether it will be incorporated into plans, reports and other deliverables.
- e. In order to provide quality assurance and maintain quality control with respect to all samples to be collected, Respondents shall ensure the following:
 - i. Quality assurance and chain of custody procedures shall be performed in accordance with standard EPA protocol and guidance, including the guidance provided in the EPA Region 2 Quality Assurance Homepage, and the guidelines set forth in this Settlement Agreement;

- ii. The laboratory(s) to be used must be specified in the QAPP. Any laboratory selected to provide analytical services shall be accredited by a national or state organization such as the National Environmental Laboratory Accreditation Program (NELAP) or the American Association for Laboratory Accreditation (A2LA). Alternatively, if the laboratory participates in the EPA Contract Laboratory Program, this requirement will be considered as fulfilled. In addition, the laboratory should submit (or Respondents shall submit on behalf of the laboratory) to EPA current copies (within the past twelve months) of laboratory certification provided from either a State or Federal Agency which conducts certification. The certification shall be applicable to the matrix/analyses which are to be conducted;
- iii. The laboratories utilized for analyses of samples must perform all analyses according to approved EPA methods or if requested by Respondent, and approved by EPA, an alternate method;
- iv. Unless indicated otherwise in the approved QAPP, upon receipt from the laboratory, all data shall be validated;
- v. Submission of the validation package (checklist, report and Form I's containing the final data) to EPA, prepared in accordance with the provisions of Subparagraph vi., below, as part of the RD Report submittal.
- vi. Assurance that all analytical data that are validated as required by the QAPP are validated according to the latest version of EPA Region 2 data validation Standard Operating Procedures. Region 2 Standard Operating Procedures are available at: <http://www.epa.gov/region02/qa/documents.htm>,
- vii. Unless indicated otherwise in the QAPP, Respondents shall require deliverables equivalent to CLP data packages from the laboratory for analytical data. Upon EPA's request, Respondents shall submit to EPA the full documentation (including raw data) for this analytical data. EPA reserves the right to perform an

independent data validation, data validation check, or qualification check on generated data; and

- viii. Respondents shall insert a provision in their contract(s) with the laboratory utilized for analyses of samples that requires granting access to EPA personnel and authorized representatives of the EPA for the purpose of ensuring the accuracy of laboratory results related to the Site.

E. The Health and Safety Plan (HASP) shall be developed by Respondents to address the protection of public health and safety and the response to contingencies that could impact public health, safety, and the environment. The HASP shall satisfy the requirements of the Occupational Safety and Health Guidance for Hazardous Waste Site Activities, (June 1990, DHHS NIOSH Publication No. 90-117), and the Occupational Safety and Health Administration, U.S. Department of Labor (OSHA) requirements cited below:

1. All activities performed by or on behalf of Respondents shall be performed in such a manner as to ensure the safety and health of personnel so engaged. Activities shall be conducted in accordance with all pertinent general industry (29 CFR Part 1910) and construction (29 CFR Part 1926) OSHA standards, and EPA's Standards Operating Safety Guides (OSWER, 1988), as well as any other applicable State and municipal codes or ordinances.
2. The HASP shall include, at a minimum, the following items:
 - a. Plans showing the location and layout of any temporary facilities to be constructed;
 - b. Description of the known hazards and evaluation of the risks associated with the area of contaminated groundwater and related potential health impacts;
 - c. List of key personnel and alternates responsible for safety, response operations, and protection of the public;
 - d. Description of levels of protection (based on specified standards) to be used by all personnel;
 - e. Delineation of work, decontamination, and safe zones, and definitions of the movement of zones;

- f. Description of decontamination procedures for personnel and equipment, and handling and removal of disposable clothing or equipment;
- g. Incidental emergency procedures which address emergency care for personnel injuries and exposure problems, and containment measures. These procedures shall include evacuation routes, internal and external communications procedures for response to fire, explosion, or other emergencies, the name of the nearest hospital and the route to that hospital. Local agencies with the capability to respond to emergencies shall be identified and their capabilities shall be described. A description of the procedures for informing the local agencies of these measures shall be outlined;
- h. Description of the personnel medical surveillance program in effect;
- i. Description of monitoring for personnel safety;
- j. Description of routine and special personnel training programs; and
- k. Description of an air monitoring program, if required, to determine concentrations of airborne contaminants to which workers or others may be exposed. The results of work-zone air monitoring may be used as a trigger for implementing air monitoring.

V. REMEDIAL DESIGN ACTIVITIES

- A. Respondents shall perform the RD of the remedy selected in the ROD. The RD activities to be performed pursuant to and in accordance with this SOW, the Settlement Agreement and the ROD include, but are not limited to, the following:
 - 1. Development of planning documents including but not limited to work plans and schedules for remedy implementation. Tasks shall include pre-RD activities and investigations, preliminary design report (35% completion) which will include the findings and results of the pre-RD activities and investigations, an intermediate design (65%) and a final

design report (100% completion). Schedules shall be consistent with the schedule for completion of the remedy specified in the ROD;

2. Detailed design of all the components of the remedy, described in Section I, including, but not limited to: the dredging of the “soft” sediment, capping with a multilayer cap, ISS, excavation and restoration of the 1st Street Basin and the portion of the 5th Street basin specified in the remedy, treatment and disposal of dredged sediment, and the construction of two retention tanks and associated infrastructure in the vicinity of the RH-034 and OH-007 CSO outfalls;
3. Tasks required for implementing institutional controls;
4. Tasks for construction, operation, and maintenance of all remedy components;
5. Tasks to monitor the effectiveness of ISS, the active cap, the cut-off walls and retention tanks;
6. To the extent that EPA conducts data collection and any ISS pilot study work, Respondents shall incorporate such work into the RD; and
7. Tasks to identify how the RD and the RA will be implemented using the principles specified in EPA Region 2’s Clean and Green Policy and NYSDEC’s Green Remediation Policy.⁵

VI. REMEDIAL DESIGN WORK PLAN

- A. Within thirty (30) days of the Effective Date of the Settlement Agreement, Respondents shall submit to EPA a work plan for the design of the Remedial Action at the Site (Remedial Design Work Plan or RD Work Plan). The RD Work Plan shall provide a detailed plan for the design of the remedy set forth in the ROD, in accordance with this SOW and for achievement of the Performance Standards and other requirements set forth in the ROD, the Settlement Agreement, and this SOW. EPA will either approve the RD Work Plan or otherwise respond pursuant to Section IX (EPA Approval of Plans and Other Submissions) of the Settlement Agreement.
- B. The RD Work Plan shall also be prepared in accordance with relevant EPA guidance, including EPA’s *Guidance on Oversight of Remedial*

⁵ See http://epa.gov/region2/superfund/green_remediation and http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf.

Designs and Remedial Actions performed by Potentially Responsible Parties (OSWER Directive 9355.5-01, EPA/540/g-90-001), dated April 1990, and shall be in conformance, inter alia, with the *Superfund Remedial Design and Remedial Action Guidance*, dated June 1986, and any updates thereto. *Guidance for Scoping the Remedial Design* (EPA 540/R-95/025, March 1995)

- C. The RD Work Plan shall include tasks, field work, data collection, and schedules for implementation of the remedial design. The RD Work Plan shall include, but need not be limited to, the following: (1) a project schedule for all activities covered by this SOW in the form of a task/subtask activity bar chart or critical path method sequence of events; (2) a description of all RD tasks including submittal of a preliminary design report (35% completion), an intermediate design report (65%) and a final design report (100% completion); (3) a preliminary Construction Quality Assurance Project Plan (CQAPP); (4) a preliminary operation and maintenance plan for the Remedial Action and all monitoring activities; and (5) a description of how the RD will incorporate the principles found in EPA Region 2's Clean and Green Policy.
- D. If the QAPP approved by EPA for the Pre-Design activities is not adequate for sampling to be performed during the RD, Respondents shall submit an amendment to the approved QAPP for the Site to EPA for approval pursuant to Section IX (EPA Approval of Plans and other Submissions) of the Settlement Agreement.
- E. If the HASP approved by the Pre-Design activities is not adequate for the activities to be performed during the RD, Respondents shall submit an amendment to the HASP for the Site to EPA.
- F. Access and Other Approvals. The RD Work Plan shall include descriptions of known access and other approvals that Respondents will need in order to perform the Work under the Settlement Agreement. This description shall detail how such access and other approvals will be sought, and shall include a schedule for obtaining all necessary access and other approvals including, but not limited to, approval from any off-Site facility accepting waste materials shipped by or on behalf of Respondents. This description shall be updated as appropriate, if subsequent approvals are required.
- G. Institutional Controls. The RD Work Plan shall include a description of the institutional controls needed to ensure the protectiveness of the ROD remedy including, but not limited to, the existing fish consumption advisories (modified, as needed) and controls needed to protect the integrity of the cap, as well as a schedule for institutional controls implementation.

- H. Upon approval of the RD Work Plan by EPA, Respondents shall implement the RD Work Plan in accordance with the EPA-approved schedule.

VII. REMEDIAL DESIGN

- A. Respondents shall perform the RD activities in conformance with the RD Work Plan approved by EPA and within the time frames specified in the RD schedule contained in the EPA-approved RD Work Plan.
- B. In accordance with the schedule set forth in the EPA-approved RD Work Plan, Respondents shall submit the findings of the pre-remedial design investigations in the preliminary design report (35% completion). The findings should include the results and analysis of all data collected during the pre-remedial design field studies.
- C. The RD Reports (35%, 65% and 100% completion) shall be submitted to EPA in accordance with the schedule set forth in the EPA approved RD Work Plan. The RD Report shall include a discussion of the design criteria and objectives, with emphasis on the capacity and ability to meet design objectives successfully. The RD Reports shall also include the plans and specifications that have been developed at that point in time, along with a design analysis. The design analysis shall provide the rationale for the plans and specifications, including results of relevant sampling and testing performed, supporting calculations and documentation of how these plans and specifications will meet the requirements of the ROD and shall provide a discussion of any impacts these findings may have on the RD. In addition to the above, the RD Reports shall include the following items:
 - 1. Specifications for photographic documentation of the remedial construction;
 - 2. A discussion of the manner in which the RA will achieve the Performance Standards;
 - 3. A discussion of the manner in which the RA will comply with EPA Region 2's Clean and Green Policy;
 - 4. A draft schedule for RA activities;
 - 5. The draft schedule for the RA shall provide for the completion of the installation of the remedy within 6 months of EPA's approval of the RAWP. The draft schedule for RA

and monitoring activities may be revised during the remedial process, subject to EPA's approval;

6. A preliminary CQAPP which shall detail the approach to quality assurance during construction activities at the Site;
 7. A report describing those efforts made to secure access and obtain other approvals and the results of those efforts; and
 8. A plan for implementation of construction and construction oversight.
- E. EPA's comments on the preliminary design report (35%) shall be incorporated by Respondents into the intermediate design report. EPA's comments on the intermediate design report (65% completion) shall be incorporated by Respondents into the final design report (100% completion).